



TEST REPORT

Test Report No. : UL-RPT-RP11066287JD17B

Manufacturer : Flextronics International Sweden AB
Model No. : SR0020-W
FCC ID : 2AIP8I
Technology : LTE Band 26
Test Standard(s) : FCC Parts 90.635(b), 90.209(b)(7) & 90.213

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2. The results in this report apply only to the sample tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0.

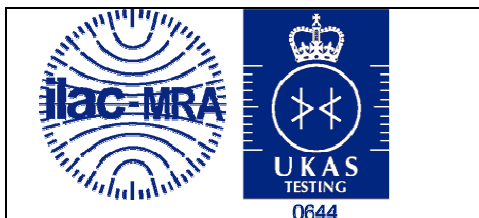
Date of Issue: 25 June 2016

Checked by:

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Company Signatory:

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UL VS LTD



This laboratory is accredited by UKAS.
The tests reported herein have been
performed in accordance with its terms
of accreditation.

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1. Customer/Manufacturer Information

1.1. Customer Information

Company Name:	Sirin Labs AG
Address:	Muhlentalstrasse 2 8200 Schaffhausen Switzerland

1.2. Manufacturer Information






Manufacturer Name:	Flextronics International Sweden AB
Address:	Datalinjen 3A SE – 583 30 Linköping Sweden

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR90
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 90 Subpart S - Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901 and 935-940 MHz Bands
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	13 May 2016 to 13 June 2016

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 90.635(b) / 2.1046	Transmitter Carrier Output Power and Effective Radiated Power (ERP)	
Part 90.209(b)(7) / 2.1049	Transmitter Occupied Bandwidth	
Part 90.213 / 2.1055	Transmitter Frequency Stability (Temperature and Voltage Variation)	
Key to Results		
 = Complied  = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-D-2010
Title:	Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards.
Reference:	FCC KDB 971168 D01 v02r02, October 17 2014
Title:	Measurement Guidance for Certification of Licensed Digital Transmitters

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	SOLARIN
Model Name or Number:	SR0020-W
Test Sample Serial Number:	0108 (<i>Conducted Sample</i>)
Test Sample IMEI:	357232070003163
Hardware Version:	TP1
Software Version:	LRC1TA.1.0.2.3
Handset Cover Material:	Technical leather with titanium coating
FCC ID:	2AIP8I

3.2. Description of EUT

The equipment under test was a Mobile device supporting Cellular, WLAN, BT, BTLE, RFID & GPS Technologies.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	LTE		
Type of Equipment	Transceiver		
Channel Bandwidth:	1.4, 3, 5 & 10 MHz		
Modulation Type:	QPSK & 16QAM		
Duty Cycle:	100 %		
Duty Cycle:	100 %		
Antenna Gain:	-2.96 dBi		
Power Supply Requirement(s):	Nominal	3.9 VDC	
	Minimum	3.5 VDC	
	Maximum	4.4 VDC	
Transmit Frequency Range:	814 MHz to 824 MHz		
Channels Tested:	Channel Bandwidth (MHz)	N_{ul}	Frequency of Uplink (MHz)
Bottom Channel	1.4	26697	814.7
	3	26705	815.5
	5	26715	816.5
Middle Channel	All	26740	819.0
Top Channel	1.4	26783	823.3
	3	26775	822.5
	5	26765	821.5

Note:

Based on the information contained in *Interim Guidance for Equipment Authorization of Devices with Channel Bandwidths Combined Across Two Contiguous Service Rule Allocations* OET/Lab/EACB, June 6, 2013, all supported emissions were tested on 824.0 MHz as the boundary frequency between FCC Rule Part 90-S and Rule Part 22-H. As Rule Part 22-H has the more onerous limits, the boundary emissions have been tested against this, and so are not included in this report.

3.5. Support Equipment

No support equipment was used for the tests shown in this report.

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transmit Mode - The EUT was set to transmit with maximum output power using the required channel bandwidth. QPSK and 16QAM modulations were both tested, with Resource Block allocation as detailed in section 4.3.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The EUT was connected to a Rohde and Schwarz CMW500 LTE system simulator, operating in a transceiver mode.
- Conducted measurements were performed using a conducted sample supplied by the customer. Short 4-wire DC flying leads were connected internally to the device in place of the battery, and exiting through a hole in the casing. These leads were then extended through a connector interface to a laboratory DC power supply.
- For conducted cellular measurements, the EUT RF conducted port was a temporary SMA connector that was connected internally in place of the pcb antenna. The loss of the internal connection to the connector was accounted for in calculations.
- For the conducted tests in this report, the antenna port measured was identified by the manufacturer as Antenna #2.

4.3. Resource Block Allocation

Channel Bandwidth (MHz)	Maximum No. of Resource Blocks	Resource Block / Offset Number							
		Sub Test 1		Sub Test 2		Sub Test 3		Sub Test 4	
		RB	Offset	RB	Offset	RB	Offset	RB	Offset
1.4	6	1	0	1	5	3	2	6	0
3	15	1	0	1	14	8	4	15	0
5	25	1	0	1	24	12	6	25	0
10	50	1	0	1	49	25	12	50	0

Transmitter Output Power was carried out using sub tests 1, 2, 3 and 4, with both QPSK and 16QAM modulation schemes.

Transmitter Occupied Bandwidth was carried out using sub test 4, for both QPSK and 16QAM modulation schemes.

Transmitter Frequency Stability test was carried out with sub test 4, with a channel bandwidth of 1.4 MHz only.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6* for Measurement Uncertainty details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Carrier Output Power and Effective Radiated Power (ERP)

Test Summary:

Test Engineer:	Keith Tucker	Test Date:	13 May 2016
Test Sample IMEI:	357232070003163		

FCC Reference:	Parts 90.635(b) and 2.1046
Test Method Used:	KDB 971168 Section 2.2 footnote 1 & Notes below

Environmental Conditions:

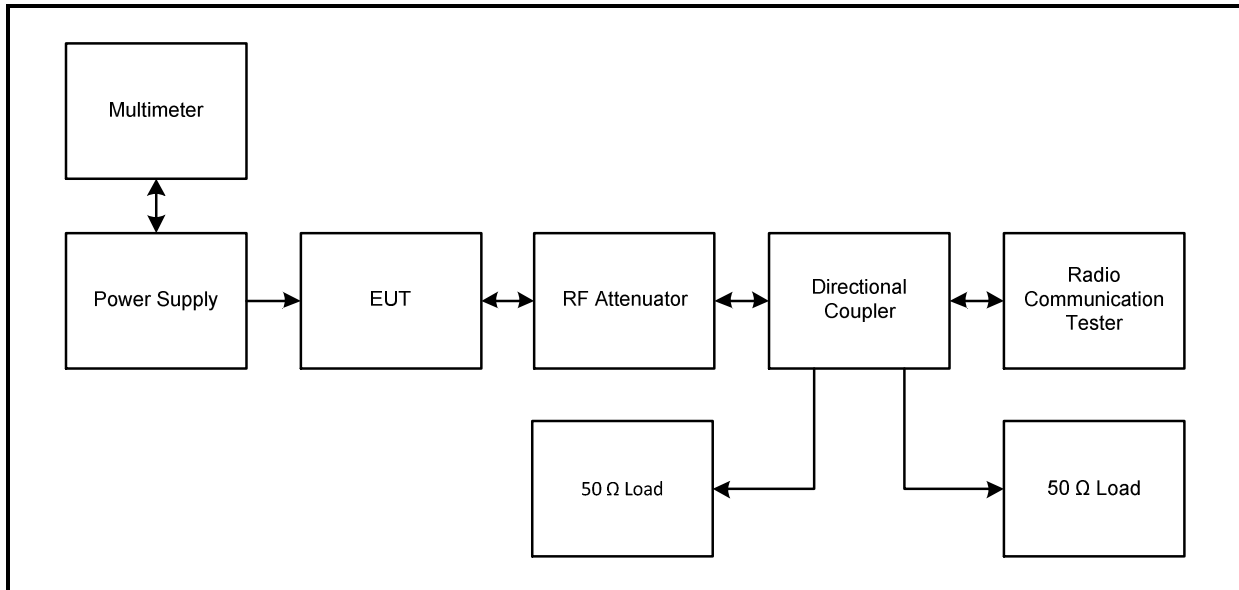
Temperature (°C):	24
Relative Humidity (%):	44

Note(s):

- The customer stated that the EUT has a maximum antenna gain of -2.96 dBi. As the limit is ERP, the gain in dBi has been converted. The dBd gain figure has been calculated as:

$$-2.96 \text{ dBi} - 2.15 \text{ dB} = -5.11 \text{ dBd}$$
- Conducted average power was measured using a calibrated Rohde and Schwarz CMW 500 Wideband Radio Communication Tester.
- Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks settings as detailed in section 4.3 of this report.

Test setup:



Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Results: 1.4 MHz Channel Bandwidth / Bottom Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
814.7	6	0	21.92	-5.11	16.81	50.0	33.19	Complied
814.7	3	2	23.09	-5.11	17.98	50.0	32.02	Complied
814.7	1	0	23.75	-5.11	18.64	50.0	31.36	Complied
814.7	1	5	23.66	-5.11	18.55	50.0	31.45	Complied

Results: 1.4 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
814.7	6	0	20.94	-5.11	15.83	50.0	34.17	Complied
814.7	3	2	22.01	-5.11	16.90	50.0	33.10	Complied
814.7	1	0	22.22	-5.11	17.11	50.0	32.89	Complied
814.7	1	5	22.23	-5.11	17.12	50.0	32.88	Complied

Results: 1.4 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	6	0	21.91	-5.11	16.80	50.0	33.20	Complied
819.0	3	2	23.34	-5.11	18.23	50.0	31.77	Complied
819.0	1	0	23.33	-5.11	18.22	50.0	31.78	Complied
819.0	1	5	23.37	-5.11	18.26	50.0	31.74	Complied

Results: 1.4 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	6	0	20.83	-5.11	15.72	50.0	34.28	Complied
819.0	3	2	22.37	-5.11	17.26	50.0	32.74	Complied
819.0	1	0	22.56	-5.11	17.45	50.0	32.55	Complied
819.0	1	5	22.61	-5.11	17.50	50.0	32.50	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Results: 1.4 MHz Channel Bandwidth / Top Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
823.3	6	0	21.82	-5.11	16.71	50.0	33.29	Complied
823.3	3	2	23.32	-5.11	18.21	50.0	31.79	Complied
823.3	1	0	23.31	-5.11	18.20	50.0	31.80	Complied
823.3	1	5	23.55	-5.11	18.44	50.0	31.56	Complied

Results: 1.4 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
823.3	6	0	20.81	-5.11	15.70	50.0	34.30	Complied
823.3	3	2	22.31	-5.11	17.20	50.0	32.80	Complied
823.3	1	0	22.50	-5.11	17.39	50.0	32.61	Complied
823.3	1	5	22.25	-5.11	17.14	50.0	32.86	Complied

Results: 3 MHz Channel Bandwidth / Bottom Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
815.5	15	0	22.08	-5.11	16.97	50.0	33.03	Complied
815.5	8	4	21.90	-5.11	16.79	50.0	33.21	Complied
815.5	1	0	23.40	-5.11	18.29	50.0	31.71	Complied
815.5	1	14	23.53	-5.11	18.42	50.0	31.58	Complied

Results: 3 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
815.5	15	0	21.10	-5.11	15.99	50.0	34.01	Complied
815.5	8	4	20.89	-5.11	15.78	50.0	34.22	Complied
815.5	1	0	22.29	-5.11	17.18	50.0	32.82	Complied
815.5	1	14	22.19	-5.11	17.08	50.0	32.92	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Results: 3 MHz Channel Bandwidth / Middle Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	15	0	21.91	-5.11	16.80	50.0	33.20	Complied
819.0	8	4	21.92	-5.11	16.81	50.0	33.19	Complied
819.0	1	0	23.01	-5.11	17.90	50.0	32.10	Complied
819.0	1	14	23.30	-5.11	18.19	50.0	31.81	Complied

Results: 3 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	15	0	20.92	-5.11	15.81	50.0	34.19	Complied
819.0	8	4	20.99	-5.11	15.88	50.0	34.12	Complied
819.0	1	0	22.77	-5.11	17.66	50.0	32.34	Complied
819.0	1	14	22.76	-5.11	17.65	50.0	32.35	Complied

Results: 3 MHz Channel Bandwidth / Top Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
822.5	15	0	21.87	-5.11	16.76	50.0	33.24	Complied
822.5	8	4	21.95	-5.11	16.84	50.0	33.16	Complied
822.5	1	0	22.86	-5.11	17.75	50.0	32.25	Complied
822.5	1	14	22.97	-5.11	17.86	50.0	32.14	Complied

Results: 3 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
822.5	15	0	20.91	-5.11	15.80	50.0	34.20	Complied
822.5	8	4	21.12	-5.11	16.01	50.0	33.99	Complied
822.5	1	0	23.01	-5.11	17.90	50.0	32.10	Complied
822.5	1	14	23.32	-5.11	18.21	50.0	31.79	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Bottom Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
816.5	25	0	21.93	-5.11	16.82	50.0	33.18	Complied
816.5	12	6	21.93	-5.11	16.82	50.0	33.18	Complied
816.5	1	0	23.17	-5.11	18.06	50.0	31.94	Complied
816.5	1	24	23.28	-5.11	18.17	50.0	31.83	Complied

Results: 5 MHz Channel Bandwidth / Bottom Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
816.5	25	0	20.81	-5.11	15.70	50.0	34.30	Complied
816.5	12	6	20.94	-5.11	15.83	50.0	34.17	Complied
816.5	1	0	22.47	-5.11	17.36	50.0	32.64	Complied
816.5	1	24	22.76	-5.11	17.65	50.0	32.35	Complied

Results: 5 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	25	0	21.88	-5.11	16.77	50.0	33.23	Complied
819.0	12	6	21.86	-5.11	16.75	50.0	33.25	Complied
819.0	1	0	23.57	-5.11	18.46	50.0	31.54	Complied
819.0	1	24	23.33	-5.11	18.22	50.0	31.78	Complied

Results: 5 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	25	0	20.92	-5.11	15.81	50.0	34.19	Complied
819.0	12	6	20.92	-5.11	15.81	50.0	34.19	Complied
819.0	1	0	22.07	-5.11	16.96	50.0	33.04	Complied
819.0	1	24	22.40	-5.11	17.29	50.0	32.71	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Results: 5 MHz Channel Bandwidth / Top Channel / QPSK**

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
821.5	25	0	21.89	-5.11	16.78	50.0	33.22	Complied
821.5	12	6	21.87	-5.11	16.76	50.0	33.24	Complied
821.5	1	0	23.44	-5.11	18.33	50.0	31.67	Complied
821.5	1	24	23.45	-5.11	18.34	50.0	31.66	Complied

Results: 5 MHz Channel Bandwidth / Top Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
821.5	25	0	20.85	-5.11	15.74	50.0	34.26	Complied
821.5	12	6	20.86	-5.11	15.75	50.0	34.25	Complied
821.5	1	0	22.46	-5.11	17.35	50.0	32.65	Complied
821.5	1	24	22.49	-5.11	17.38	50.0	32.62	Complied

Results: 10 MHz Channel Bandwidth / Middle Channel / QPSK

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	50	0	21.87	-5.11	16.76	50.0	33.24	Complied
819.0	25	12	21.95	-5.11	16.84	50.0	33.16	Complied
819.0	1	0	23.26	-5.11	18.15	50.0	31.85	Complied
819.0	1	49	23.36	-5.11	18.25	50.0	31.75	Complied

Results: 10 MHz Channel Bandwidth / Middle Channel / 16QAM

Frequency (MHz)	Resource Block(s)	Resource Block Offset	Conducted RF Power (dBm)	Antenna Gain (dBd)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
819.0	50	0	20.91	-5.11	15.80	50.0	34.20	Complied
819.0	25	12	21.07	-5.11	15.96	50.0	34.04	Complied
819.0	1	0	22.51	-5.11	17.40	50.0	32.60	Complied
819.0	1	49	22.52	-5.11	17.41	50.0	32.59	Complied

Transmitter Carrier Output Power and Effective Radiated Power (ERP) (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
M1869	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145923	05 Apr 2017	12
A2845	Attenuator	Radiall	R411.806.121	24325927	Calibrated before use	-
A2844	Attenuator	Radiall	R411.803.121	23404066	Calibrated before use	-
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
S0577	Power Supply	TTi	CPX400S	436670	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	26 May 2016	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	26 Feb 2017	12

5.2.2. Transmitter Occupied Bandwidth

Test Summary:

Test Engineer:	Keith Tucker	Test Date:	13 May 2016
Test Sample IMEI:	357232070003163		

FCC Reference:	Parts 90.209(b)(7) and 2.1049
Test Method Used:	KDB 971168 Section 4.2

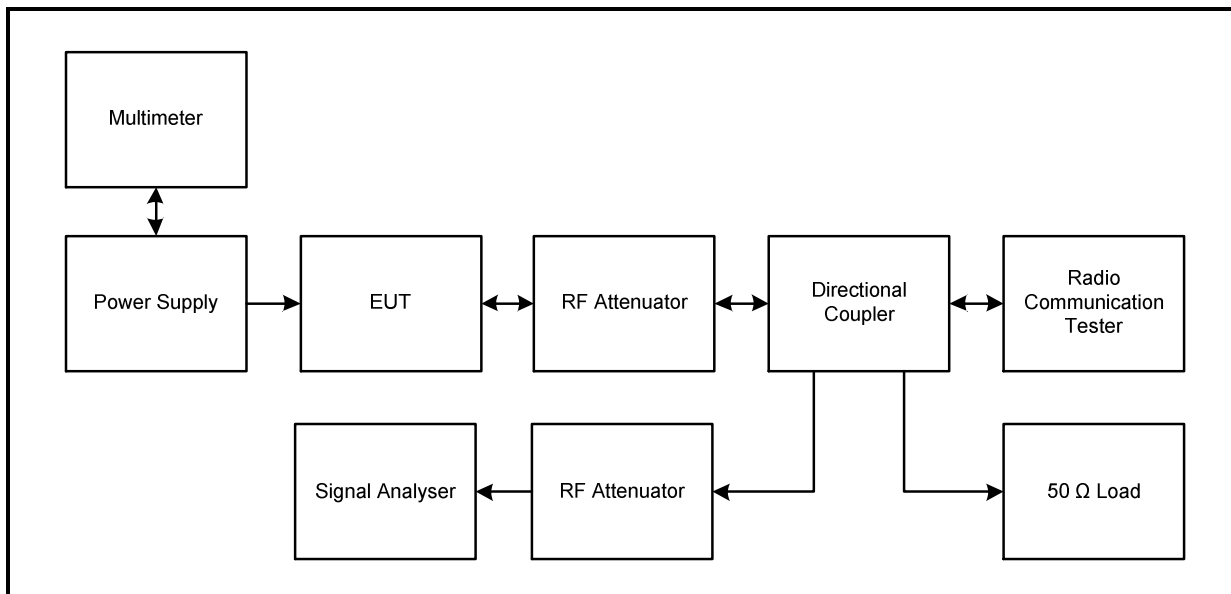
Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	44

Note(s):

1. Occupied bandwidth (99% bandwidth) was measured using a signal analyser occupied bandwidth function.
2. Measurements were performed with the EUT transmitting with QPSK and 16QAM modulation schemes, with resource blocks settings as detailed in section 4.3 of this report.
3. The RF port of the EUT was connected to the spectrum analyser via RF cables, directional coupler and suitable attenuation.

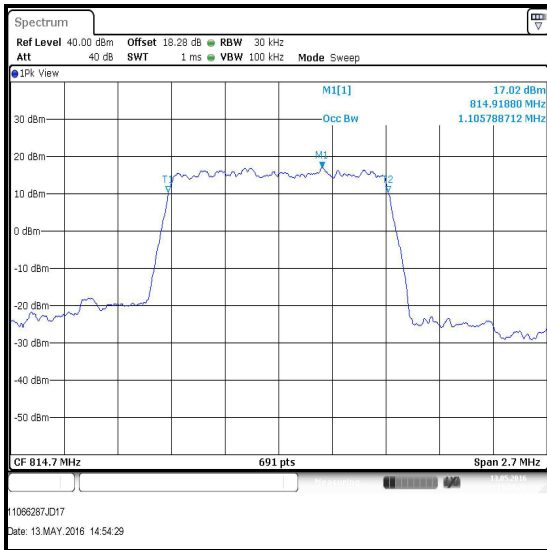
Test setup:



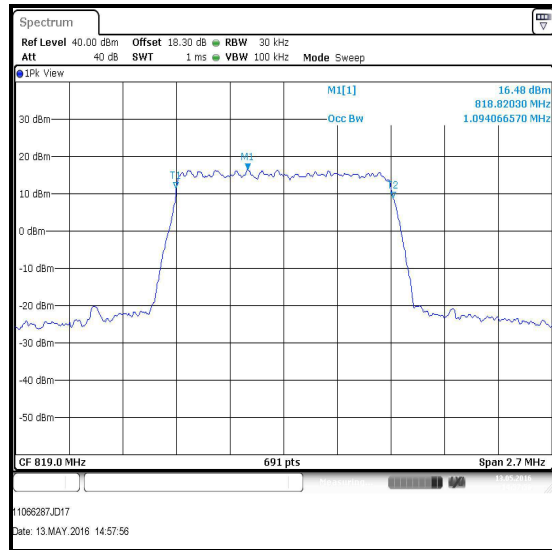
Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / QPSK

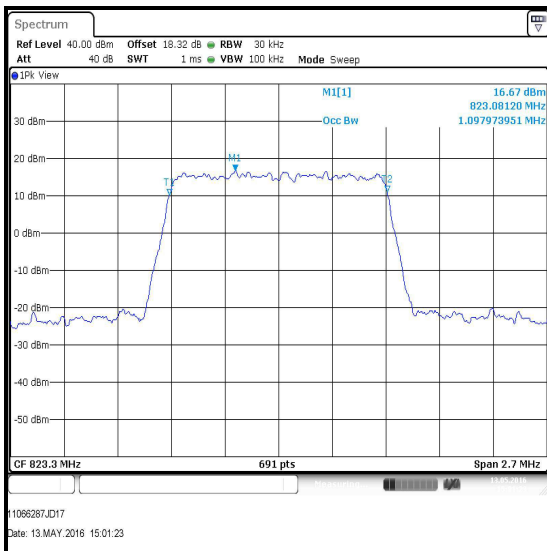
Channel	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	6	0	30	100	1.106
Middle	6	0	30	100	1.094
Top	6	0	30	100	1.098



Bottom Channel / QPSK



Middle Channel / QPSK



Top Channel / QPSK

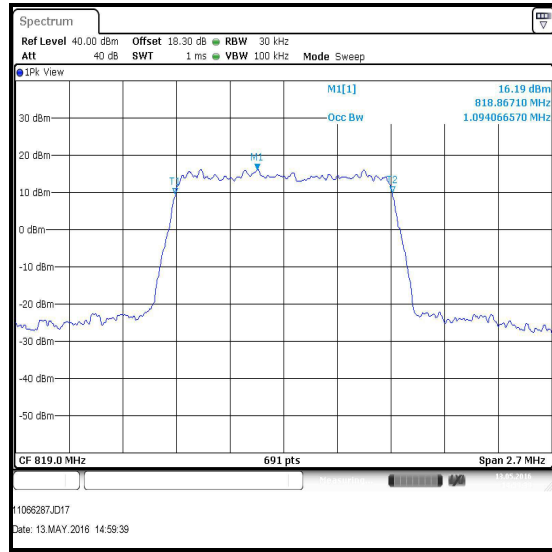
Transmitter Occupied Bandwidth (continued)

Results: 1.4 MHz Channel Bandwidth / 16QAM

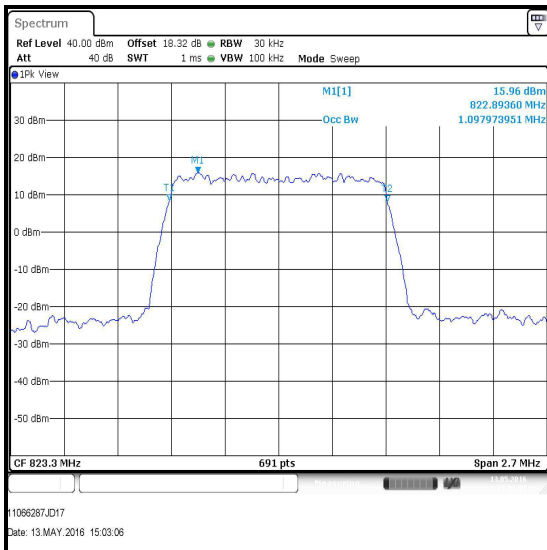
Channel	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	6	0	30	100	1.090
Middle	6	0	30	100	1.094
Top	6	0	30	100	1.098



Bottom Channel / 16QAM



Middle Channel / 16QAM

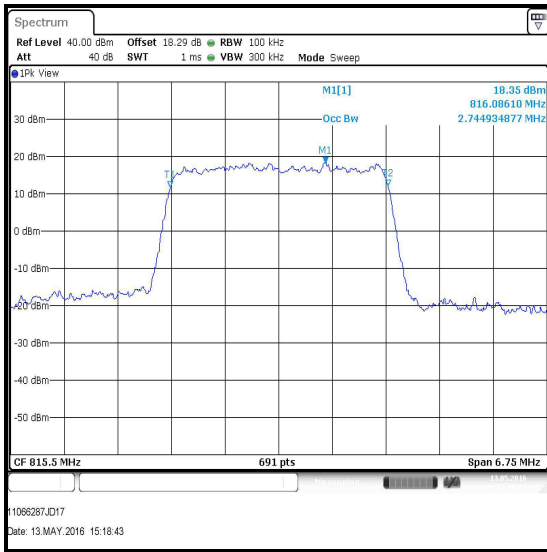


Top Channel / 16QAM

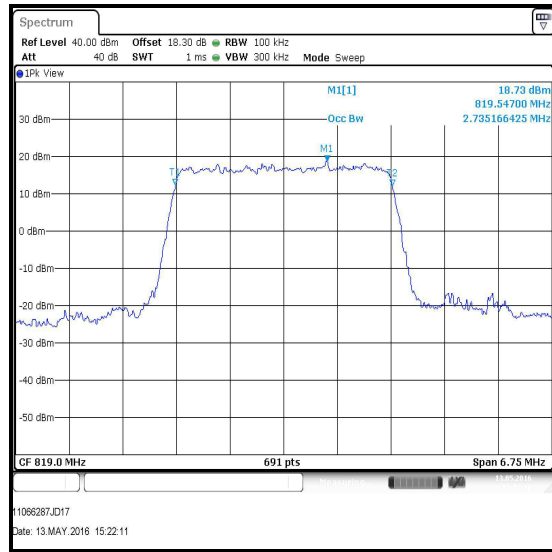
Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / QPSK

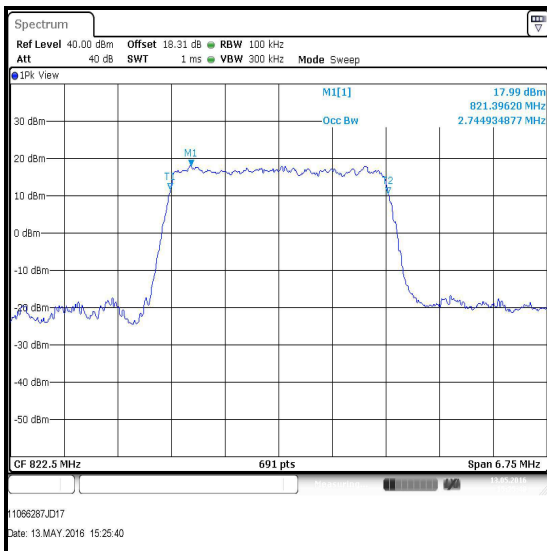
Channel	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	15	0	100	300	2.745
Middle	15	0	100	300	2.735
Top	15	0	100	300	2.745



Bottom Channel / QPSK



Middle Channel / QPSK

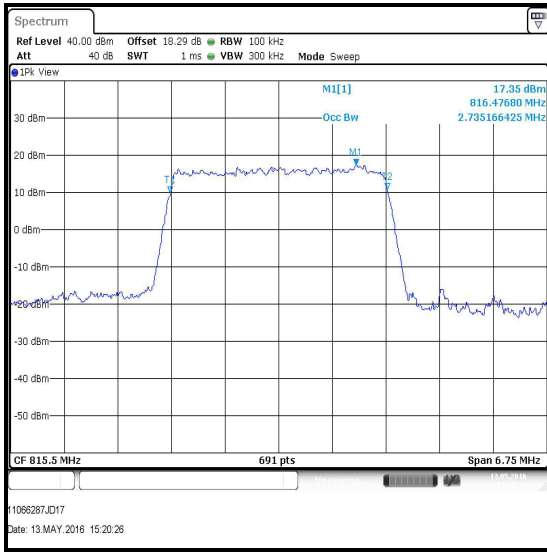


Top Channel / QPSK

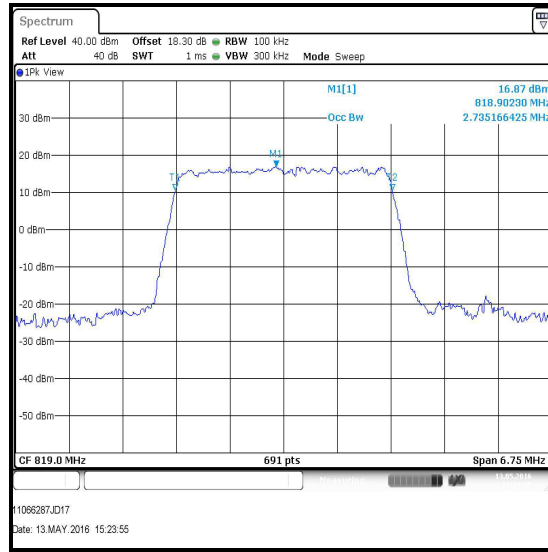
Transmitter Occupied Bandwidth (continued)

Results: 3 MHz Channel Bandwidth / 16QAM

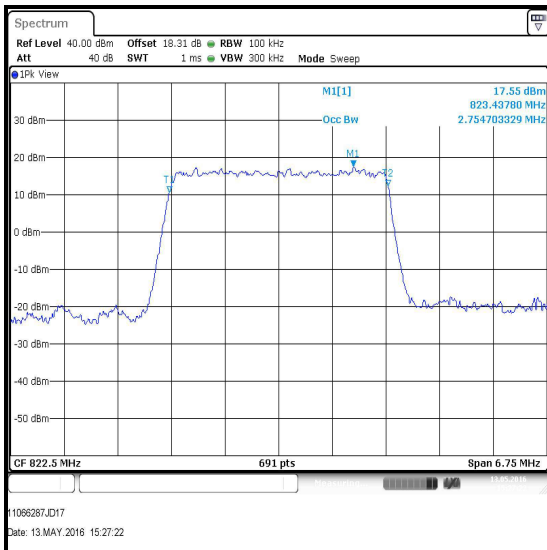
Channel	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	15	0	100	300	2.735
Middle	15	0	100	300	2.735
Top	15	0	100	300	2.755



Bottom Channel / 16QAM



Middle Channel / 16QAM

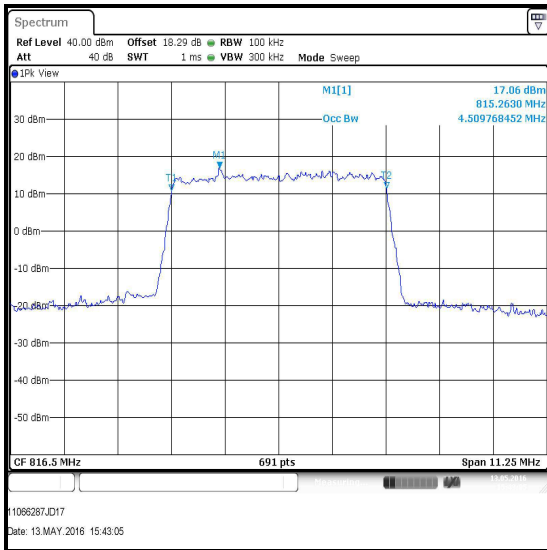


Top Channel / 16QAM

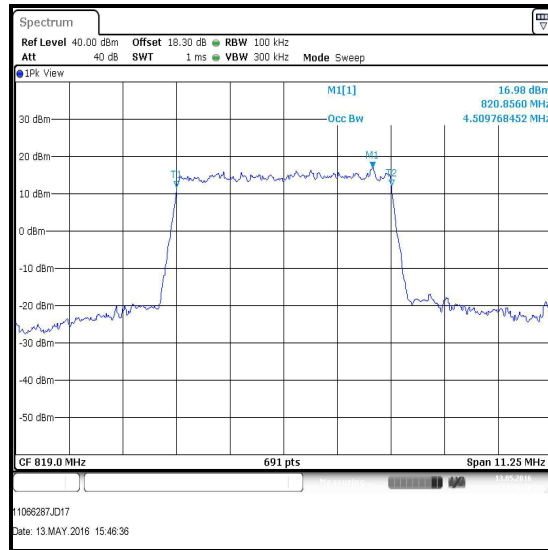
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / QPSK

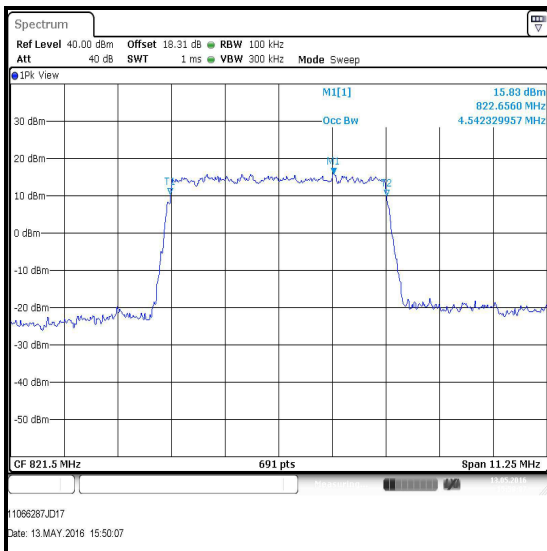
Channel	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	25	0	100	300	4.510
Middle	25	0	100	300	4.510
Top	25	0	100	300	4.542



Bottom Channel / QPSK



Middle Channel / QPSK

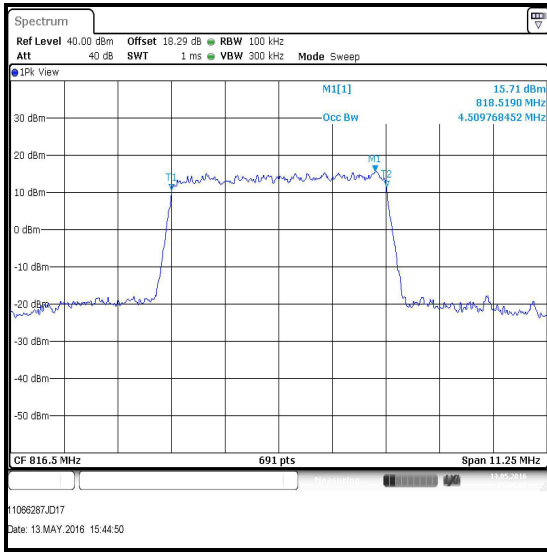


Top Channel / QPSK

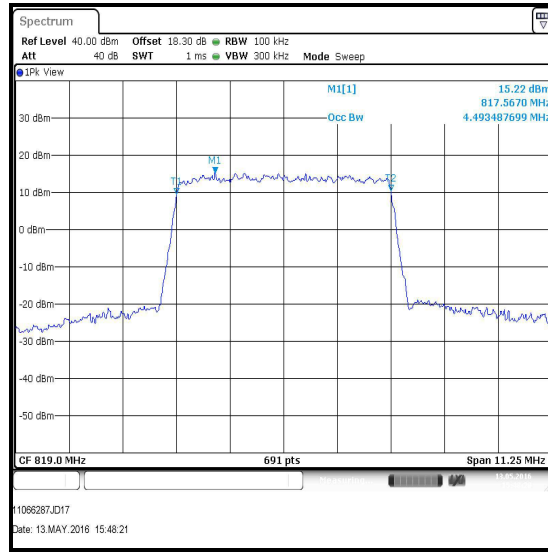
Transmitter Occupied Bandwidth (continued)

Results: 5 MHz Channel Bandwidth / 16QAM

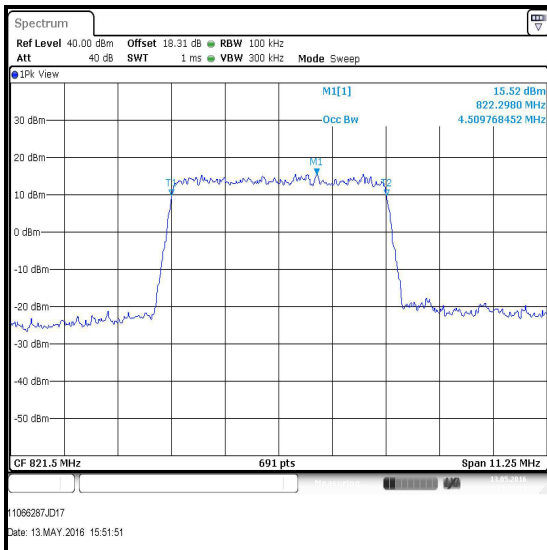
Channel	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	25	0	100	300	4.510
Middle	25	0	100	300	4.493
Top	25	0	100	300	4.510



Bottom Channel / 16QAM



Middle Channel / 16QAM

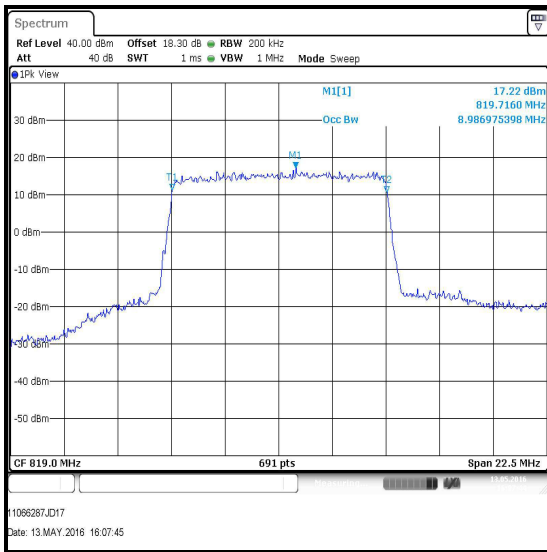


Top Channel / 16QAM

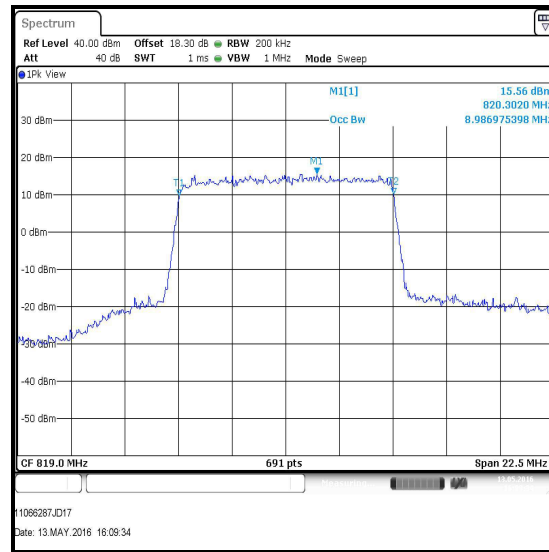
Transmitter Occupied Bandwidth (continued)

Results: 10 MHz Channel Bandwidth / Middle Channel

Modulation	Resource Block(s)	Resource Block Offset	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
QPSK	50	0	200	1000	8.987
16QAM	50	0	200	1000	8.987



Middle Channel / QPSK



Middle Channel / 16QAM

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
M1883	Signal Analyser	Rohde & Schwarz	FSV30	103084	23 Jul 2016	12
S021	Power Supply Unit	Thurlby Thandar	CPX200	061034	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	26 May 2016	12
A2845	Attenuator 6dB	Radiall	R411.806.121	24325927	Calibrated before use	-
A2844	Attenuator 3dB	Radiall	R411.803.121	23404066	Calibrated before use	-
A2504	Directional coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
G0614	Signal Generator	Rohde & Schwarz	SMB100A	177687	01 May 2017	36
M1764	Fast Power Sensor	Dare	RPR3006W	13I00030S NO36	11 Dec 2016	12

5.2.3. Transmitter Frequency Stability (Temperature Variation)**Test Summary:**

Test Engineer:	Stefan Ho	Test Date:	13 June 2016
Test Sample IMEI:	357232070003163		

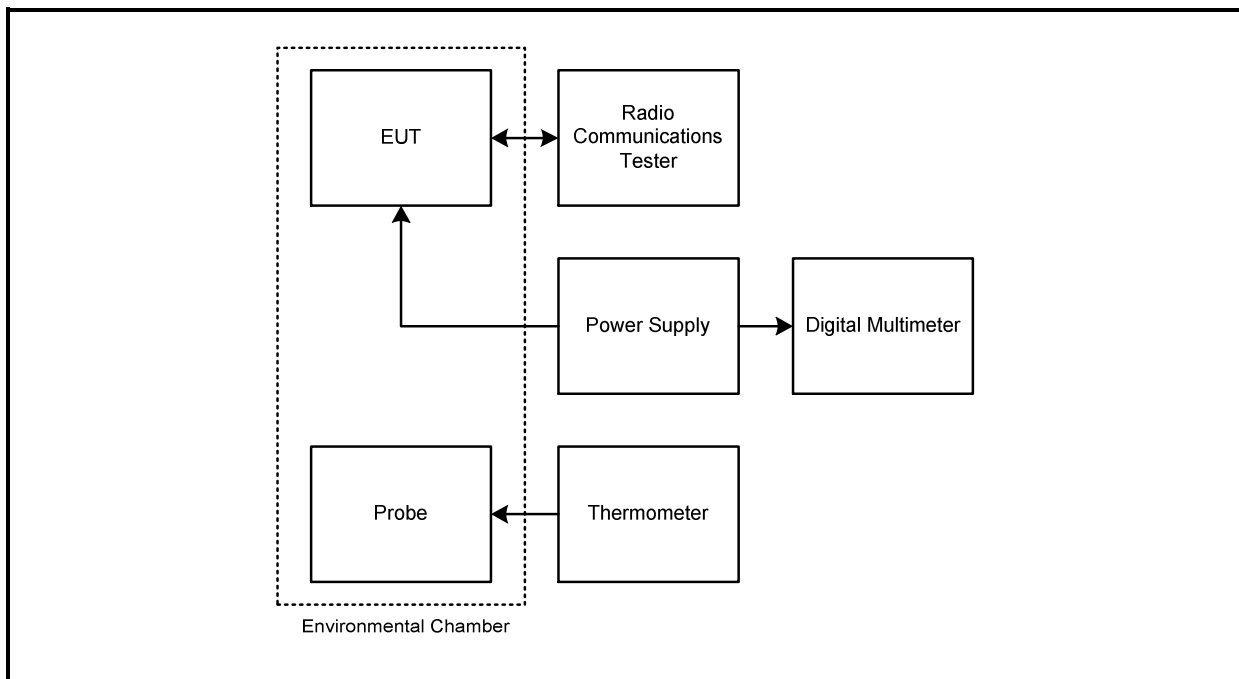
FCC Reference:	Parts 90.213 and 2.1055
Test Method Used:	KDB 971168 Section 9.0 referencing ANSI TIA-603-D-2010 Section 2.2.2 and FCC Part 2.1055

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	53

Note(s):

1. Flying leads were connected internally to the EUT in place of the battery. These leads extended and connected to a bench power supply at the nominal voltage of 3.9 V
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.

Test setup:

Transmitter Frequency Stability (Temperature Variation) (continued)**Results: Middle Channel (819.0 MHz)**

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	818.999995	5	0.0060	2.5	2.4940	Complied
-20	818.999995	5	0.0060	2.5	2.4940	Complied
-10	818.999995	5	0.0060	2.5	2.4940	Complied
0	819.000005	5	0.0060	2.5	2.4940	Complied
10	819.000005	5	0.0060	2.5	2.4940	Complied
20	818.999995	5	0.0060	2.5	2.4940	Complied
30	818.999994	6	0.0072	2.5	2.4928	Complied
40	818.999994	6	0.0072	2.5	2.4928	Complied
50	818.999994	6	0.0072	2.5	2.4928	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
M1815	Environmental Chamber	Votsch/Heraeus	VT4002	521/83083	Calibrated before use	-
M1642	Thermometer	Fluke	52II	18890119	25 Apr 2017	12
S0577	DC power supply	TTI	CPX-400S	436670	Calibrated before use	-
M1869	Wideband Radio Comms Tester	Rohde & Schwarz	CMW 500	145923	05 Apr 2017	12
M1269	Multimeter	Fluke	179	90250210	13 May 2017	12

5.2.4. Transmitter Frequency Stability (Voltage Variation)**Test Summary:**

Test Engineer:	Stefan Ho	Test Date:	13 June 2016
Test Sample IMEI:	357232070003163		

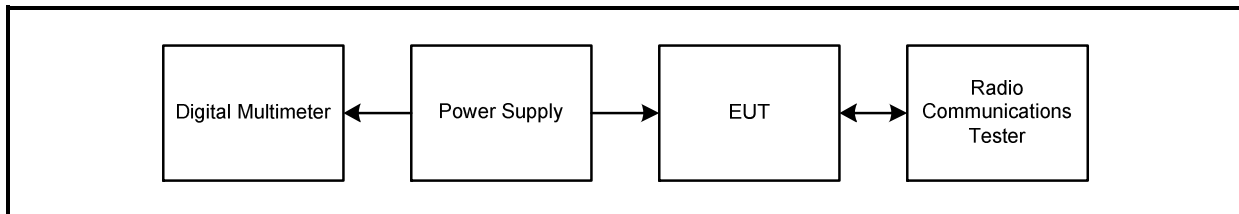
FCC Reference:	Parts 90.213 and 2.1055
Test Method Used:	KDB 971168 Section 9.0 referencing ANSI TIA-603-D-2010 Section 2.2.2 and FCC Part 2.1055

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	53

Note(s):

1. Flying leads were connected internally to the EUT in place of the battery. These leads extended and connected to a bench power supply.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Test setup:

Transmitter Frequency Stability (Voltage Variation) (continued)**Results: Middle Channel (819.0 MHz)**

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.5	819.000005	5	0.0060	2.5	2.4940	Complied
4.4	818.999995	5	0.0060	2.5	2.4940	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2002	Thermohygrometer	Testo	608-H1	45041825	02 Apr 2017	12
S0577	DC power supply	TTI	CPX-400S	436670	Calibrated before use	-
M1869	Wideband Radio Comms Tester	Rohde & Schwarz	CMW 500	145923	05 Apr 2017	12
M1269	Multimeter	Fluke	179	90250210	13 May 2017	12

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Conducted Carrier Output Power	814 MHz to 824 MHz	95%	±1.36 dB
Occupied Bandwidth	814 MHz to 824 MHz	95%	±3.92 %
Frequency Stability	814 MHz to 824 MHz	95%	±23 Hz

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version

--- END OF REPORT ---